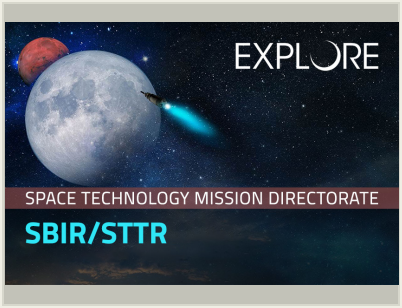
Deployable Engine Air-Brake for Drag Management Applications, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

ATA Engineering, Inc., proposes an SBIR program to demonstrate an innovative engine air-brake (EAB) technology that uses a deployable swirl vane mechanism to switch the operation of a turbofan engine nozzle from a conventional to a "drag management" mode. Such "drag on demand" enables operational benefits such as slower, steeper, and/or aeroacoustically cleaner flight on approach, addressing NASA's need for active and passive control of aeroacoustic noise sources for conventional and advanced aircraft configurations. The proposing team recently completed a Phase I/II SBIR program on the development of an EAB for quiet drag applications. This program began with design of aerodynamic concepts and progressed to fabrication and testing of several prototypes in NASA Glenn's Aero Acoustic Propulsion Laboratory. Results suggested that an appropriately designed EAB could enable a fixed-speed, steep approach trajectory from a baseline 3.2 to 4.4 degree glideslope for a 737-800-class aircraft, with 3.1 dB peak tone-corrected perceived noise (PNLT) reduction and 1.8 dB effective perceived noise level (EPNL) reduction. The previous effort culminated in a conceptual design of a bypass nozzle mechanism that stows in an aerodynamically "invisible" manner in the nozzle casing during conventional operation and introduces deployable vanes in a drag management maneuver. Current technology readiness level (TRL) is 3 to 4, and the proposed SBIR program aims to advance TRL to 5 to 6 by demonstrating a prototype that switches between stowed and deployed mode during operation. The technical objectives are to: (1) evaluate and select a candidate nozzle or engine as a demonstrator, (2) develop a preliminary aerodynamic and mechanical design of an integrated mechanism, and (3) define a validation plan that can be executed in Phase II. The final deliverable will be a written report to NASA presenting the findings and designs and defining the path forward for Phase II activities.



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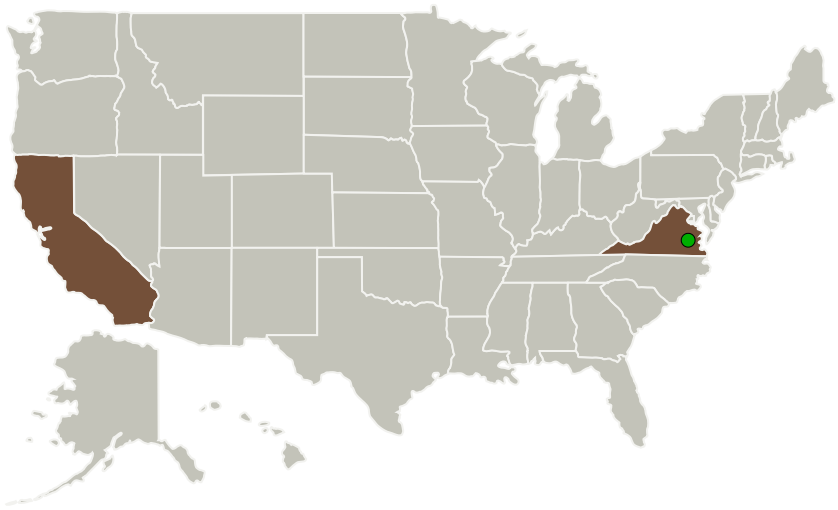
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
ATA Engineering, Inc.	Lead Organization	Industry	San Diego, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140254)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

ATA Engineering, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Parthiv N Shah

Co-Investigator:

Parthiv Shah

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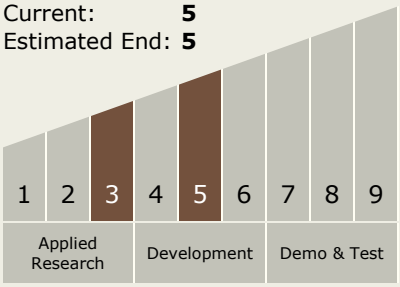
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.3 Aero Propulsion
    - TX01.3.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System